

1970

OPERATING SUMMARY

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ONTARIO WATER
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NORTH BAY

AREA

water pollution control plant

ONTARIO WATER RESOURCES COMMISSION

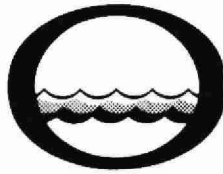
Division of Plant Operations

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Water management in Ontario

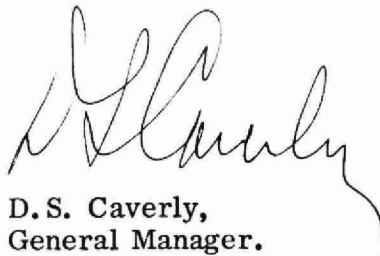
Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario


Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water pollution control plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.



D.S. Caverly,
General Manager.



D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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water pollution control plant

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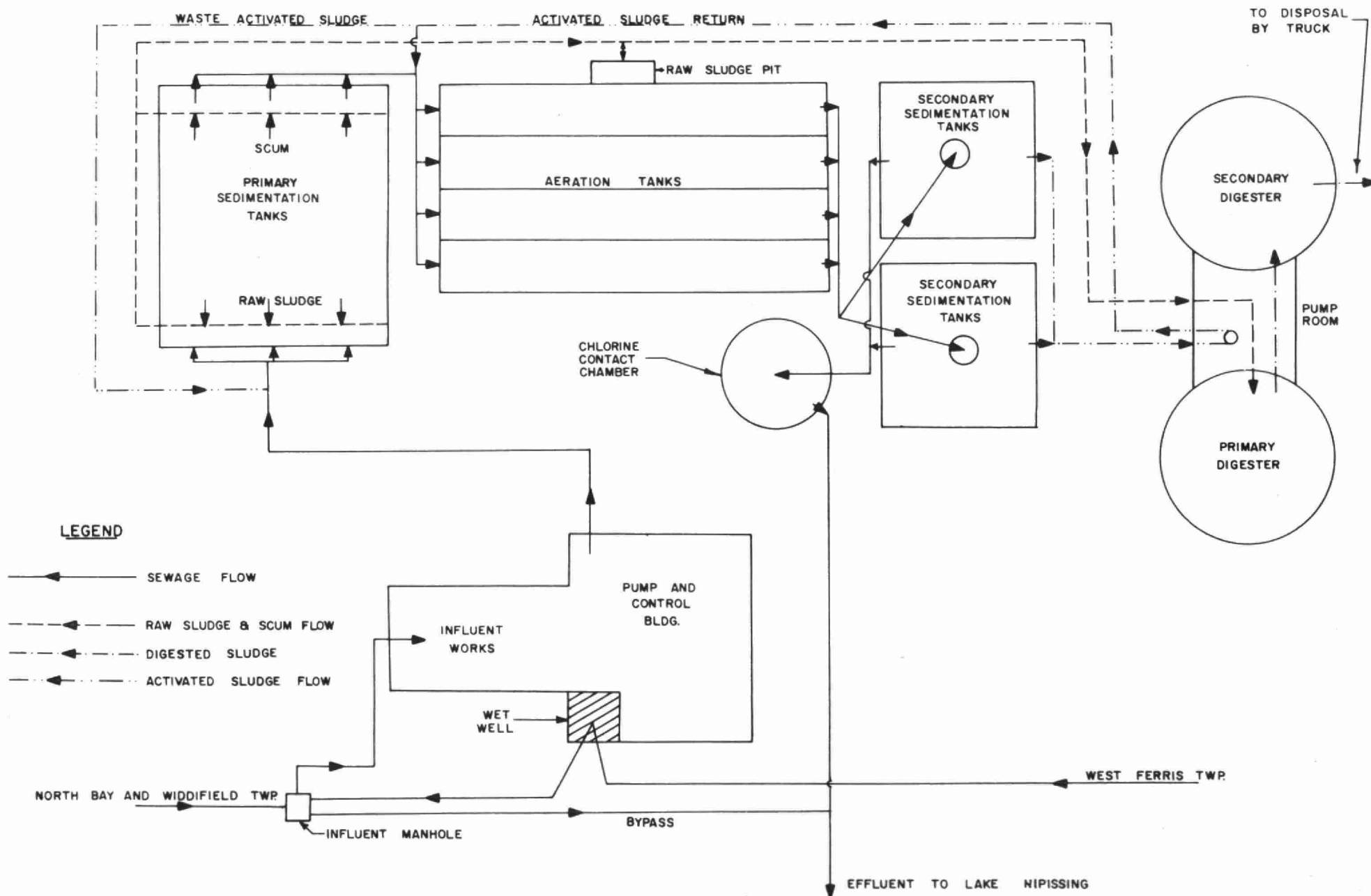
THE CITY OF NORTH BAY

by the

ONTARIO WATER RESOURCES COMMISSION

1970 ANNUAL OPERATING SUMMARY

FLOW DIAGRAM FOR NORTH BAY AREA W.P.C.P.



DESIGN DATA

PROJECT NO.	2-0010-58	TREATMENT	Activated Sludge
DESIGN FLOW	4.0 mgd	DESIGN POPULATION	50,000
BOD - Raw Sewage	150 mg/l;	Removal	85%

PRIMARY TREATMENT

Grit Removal

Type: Walker CRG
 Size: Two $11\frac{1}{2}$ X $11\frac{1}{2}$ X 2' (3,300 gal)
 Retention: 1.2 min
 Flow Velocity: 0.163 fps

Comminution

- Two Griductors (Infilco)

Sewage Lift Pumps

Type: Chicago Pumps
 Size: Two 4 mgd (gas)
 One 4 mgd (electric)

Primary Sedimentation

Type: Hardinge
 Size: Three 90 X 30 X 10'
 (0.505 mil gal)
 Retention: 3 hr
 Loading: Surface, 500 gal/ft²/day
 Weir, 44,000 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air, single-pass
 Size: Four 185 X 20 X 12'
 (1.1 mil gal)
 Retention: 6.4 hr
 Loading: 4,200 lb BOD/day

Air Supply

Type: Roots
 Size: Two 3750 cfm @ 7 psi

Diffusers

Type: Spargers
 Spacing: 70 @ $22\frac{1}{2}$ "
 14 @ $155/8$ " per tank
 32 @ $13\frac{1}{2}$ "

Secondary Sedimentation

Type: Walker RSX
 Size: Two 60 X 60 X 11' (500,000 gal)
 Retention: 3 hrs
 Loading: Surface, 550 gal/ft²/day
 Weir, 8,000 gal/ft/day

CHLORINATION

Type: BIF semi-automatic
 Size: One 500 lb/day

Chlorine Contact Chamber

Size: One 34' dia x $12\frac{1}{2}$ ' (71,000 gal)
 Retention: 25 min

OUTFALL

- 1000 ft into Lake Nipissing

SLUDGE HANDLING

Digestion System - Two-stage

Primary --

Type: Dorr (3 draft tube mixers)
 Size: One 65' dia (70,000 cu ft or
 0.436 mil gal)
 Loading: 2.4 lb/cu ft/mo

Secondary --

Size: One 65' dia (74,000 cu ft or
 0.46 mil gal)
 Total Loading: 1.2 lb/cu ft/mo

'70 REVIEW

FLOWS	DAILY FLOW mil gal	OCCURRING IN THE MONTH OF	MONTHLY FLOW mil gal	OCCURRING IN THE MONTH OF
Average	5.37	—	163	—
High	12.7	May	212	April
Low	1.7	January	110	February

GENERAL

The North Bay Water Pollution Control plant is a secondary treatment plant with a design capacity of 4.0 million gallons per day. The plant is operated by a staff of seven.

There was an increase of approximately 10 percent in the flow to the plant over the previous year and the plant operated most of the time over the design capacity. A report has been prepared recommending the expansion of the facilities.

The City of North Bay and the Ontario Water Resources Commission were involved in discussions during the year regarding a proposal which would provide for provincial ownership and operation of the existing facilities and proposed expansion.

The cleanout of the primary digester was completed and the digester was put back into operation.

EXPENDITURES

The cost of operating the plant was \$139,983.43 compared to \$121,522.69 in 1969. The cost per million gallons treated was \$71.53 compared to \$68.38 in 1968. The increased cost was mainly due to increases in the power, repairs and maintenance and sludge haulage items.

PLANT FLOWS and CHLORINATION

A total of 1,957 million gallons was treated in 1970. This represents an average daily flow for the year of approximately 5.4 mgd compared to 4.9 mgd in 1969, an increase of approximately 10 percent.

The plant flow exceeded the design capacity of 4.0 mgd approximately 83 percent of the time, 5.0 mgd, 58 percent of the time and 6.0 mgd 32 percent of the time.

The plant effluent was chlorinated from May to October and a total of 32,000 pounds of chlorine was used to maintain a 0.5 mg/l chlorine residual in the effluent.

PLANT EFFICIENCY

The raw sewage had an average concentration of 128 mg/l BOD and 246 mg/l suspended solids. The final effluent had an average concentration of 44 mg/l BOD and 41 mg/l suspended solids.

The average reduction in BOD was 65 percent and suspended solids 77 percent. These reductions were lower than generally expected for secondary treatment. The final effluent concentrations were higher than the OWRC objective of 15 mg/l for BOD and suspended solids.

A total of 7742 cubic feet of grit was removed at an average of 4.0 cubic feet per million gallons treated.

AERATION

The primary effluent had an average concentration of 94 mg/l BOD and average concentration of the mixed liquor suspended solids was 1360 mg/l. The resulting average load on the aeration section was 31 lbs. of BOD per 100 lbs. of MLSS or an F/M ratio of 0.31. An average of 2100 cubic feet of air was used per pound of BOD removed.

SLUDGE DIGESTION AND DISPOSAL

A total of 14,000,000 gallons of raw sludge was pumped at an average concentration of 3.8% solids. A total of 5,200,000 gallons of digested sludge was pumped from the digesters at an average concentration of 5.7 percent solids. The digested sludge was removed by tank truck.

CONCLUSIONS

The plant operated above the design capacity of 4.0 mgd most of the time. The resulting quality of the final effluent did not meet the OWRC objective for secondary treatment.

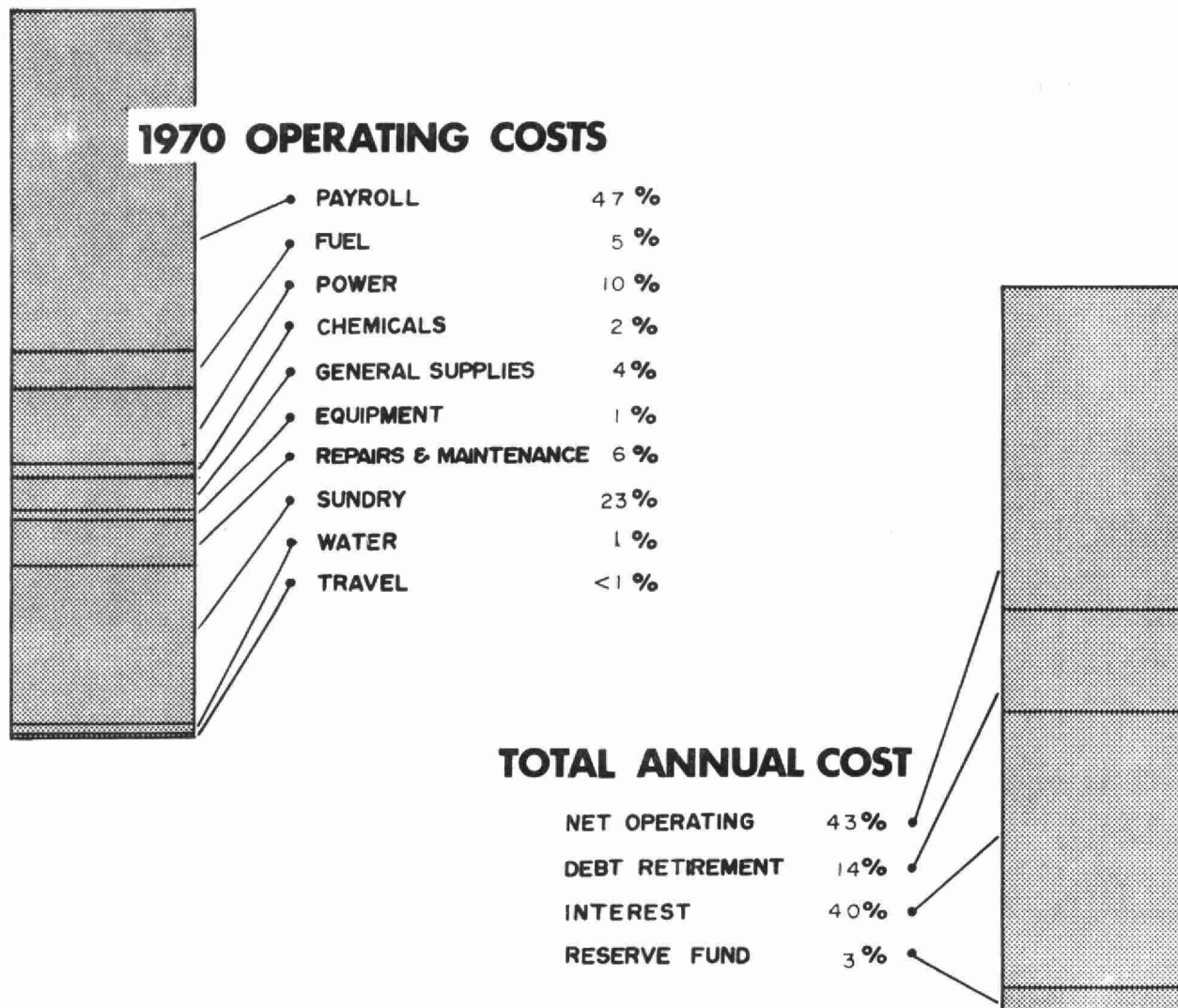
There is an immediate need for the plant expansion which is presently under final design.

PROJECT COSTS

2-0010-58 NET CAPITAL COST (Final)	\$2, 314, 543. 73
DEDUCT - Portion financed by CMHC/MDLB (Final)	<u> -</u>
Long Term Debt to OWRC	<u>\$2, 314, 543. 73</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	\$ <u>646, 973. 96</u>
Net Operating	\$ 139, 935. 43
Debt Retirement	46, 708. 00
Reserve	10, 782. 43
Interest Charged	<u>129, 644. 94</u>
TOTAL	\$ <u>327, 070. 80</u>

RESERVE ACCOUNT

Balance @ January 1, 1970	\$ 143, 419. 12
Deposited by Municipality	10, 782. 43
Interest Earned	<u>9, 355. 11</u>
	\$ 163, 556. 66
Less Expenditures	<u>6, 895. 65</u>
Balance @ December 31, 1970	\$ <u>156, 661. 01</u>



Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1966	1386.4	\$ 87,375.11	\$63.02	6 cents
1967	1438.2	94,418.15	65.65	4 cents
1968	1545.4	106,231.28	68.74	4 cents
1969	1777.2	121,522.69	68.38	7 cents
1970	1957.	139,983.43	71.52	7 cents

MONTHLY OPERATING COSTS

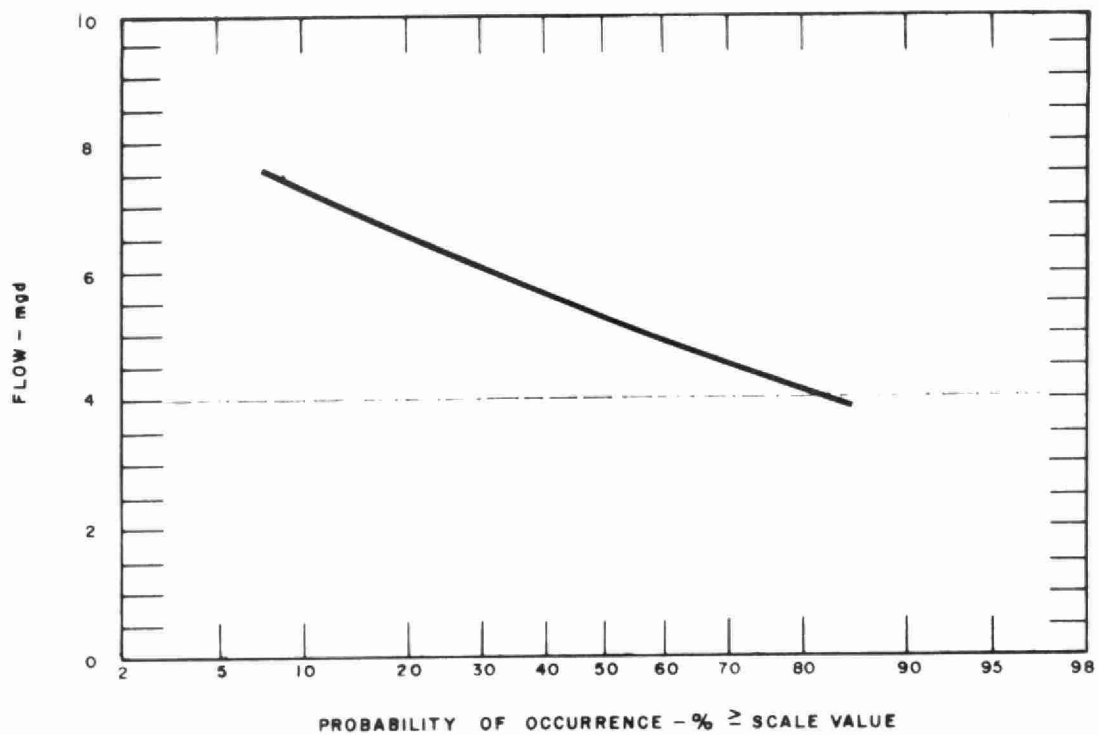
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	8974.38	6614.04	78.18	673.84	688.47	-	620.36	-	212.36	80.70	6.43	-
FEB	11374.70	4894.67	894.90	741.22	698.08	-	796.01	-	310.16	3039.66	-	-
MAR	11075.08	4777.48	-	685.63	1000.93	-	164.95	23.10	363.75	4041.64	9.65	7.95
APR	10799.97	4515.22	-	524.27	1090.15	208.95	459.40	-	1375.68	2568.33	15.27	42.70
MAY	11446.91	4944.54	518.34	494.20	1431.73	2440.20	454.65	75.71	906.99	92.15	36.04	52.36
JUNE	11783.52	4361.41	1128.57	468.37	1297.65	100.38	676.99	453.98	250.40	3045.77	-	-
JULY	15167.02	4409.36	1015.65	344.40	1198.51	37.22	474.03	812.76	822.63	5992.46	-	-
AUG	13475.28	6508.56	1296.24	347.75	162.63	-	404.52	-	1068.16	2493.57	1193.85	-
SEPT	12366.44	4319.61	837.20	321.74	1355.00	-	334.50	239.95	734.21	3549.92	674.31	-
OCT	10797.75	4456.29	497.35	582.55	1386.11	-	403.03	76.82	489.23	2612.26	259.98	34.13
NOV	9399.85	4543.84	74.86	131.43	1157.08	-	232.93	-	601.94	2441.90	215.87	-
DEC	13322.53	4560.20	-	1041.21	3506.87	-	811.87	129.00	1603.76	2467.36	(960.18)	162.44
TOTAL	139983.43	58905.22	6341.29	6356.61	14973.21	2786.75	5833.24	1811.32	8799.27	32425.72	1451.22	299.58

BRACKETS INDICATE CREDIT

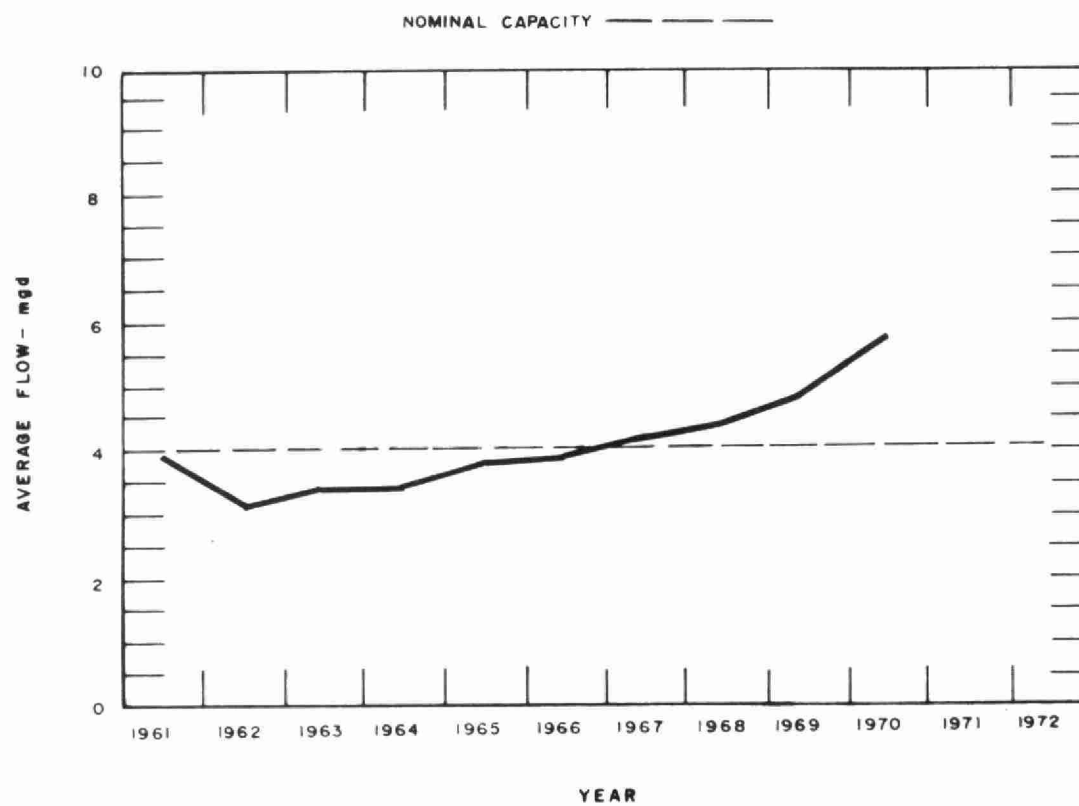
* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE \$31,358.52

Note: Total does not include year-end adjustments.

PROCESS DATA

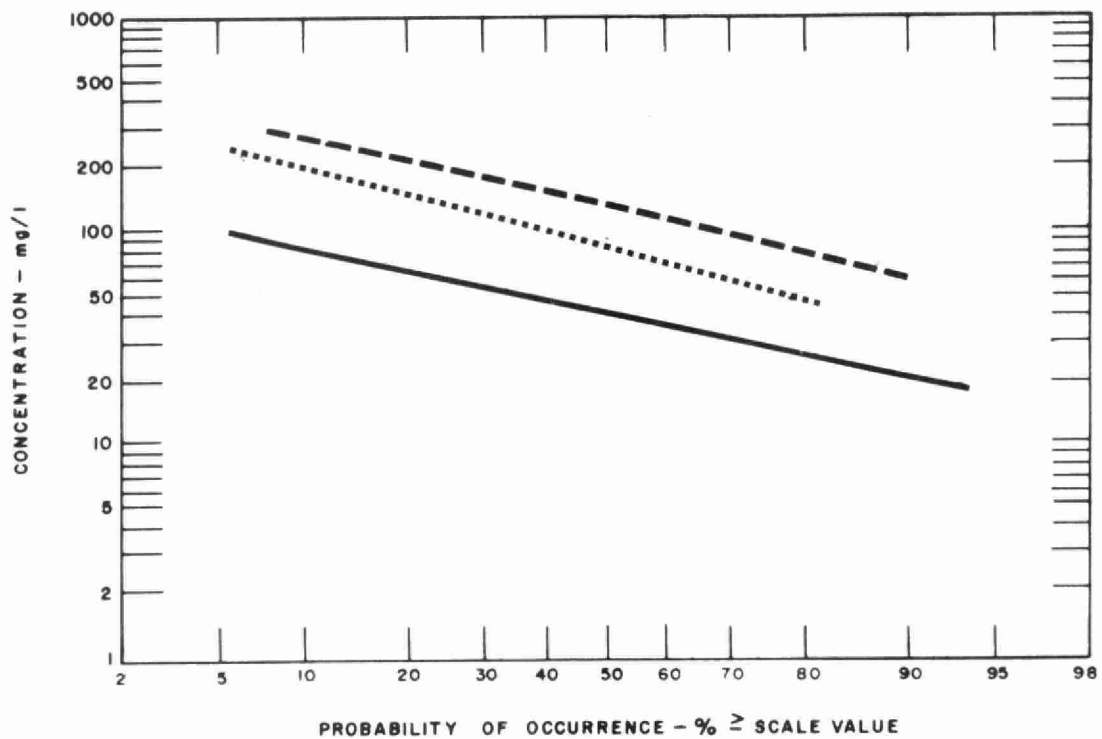


FLAWS

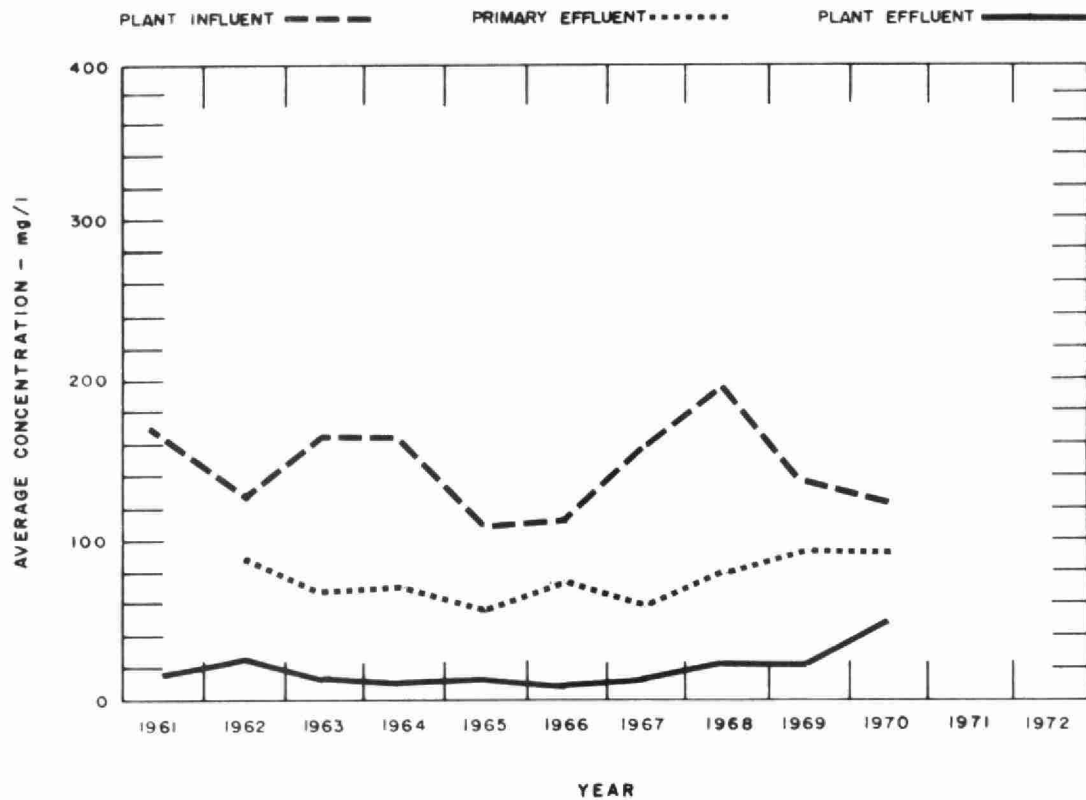


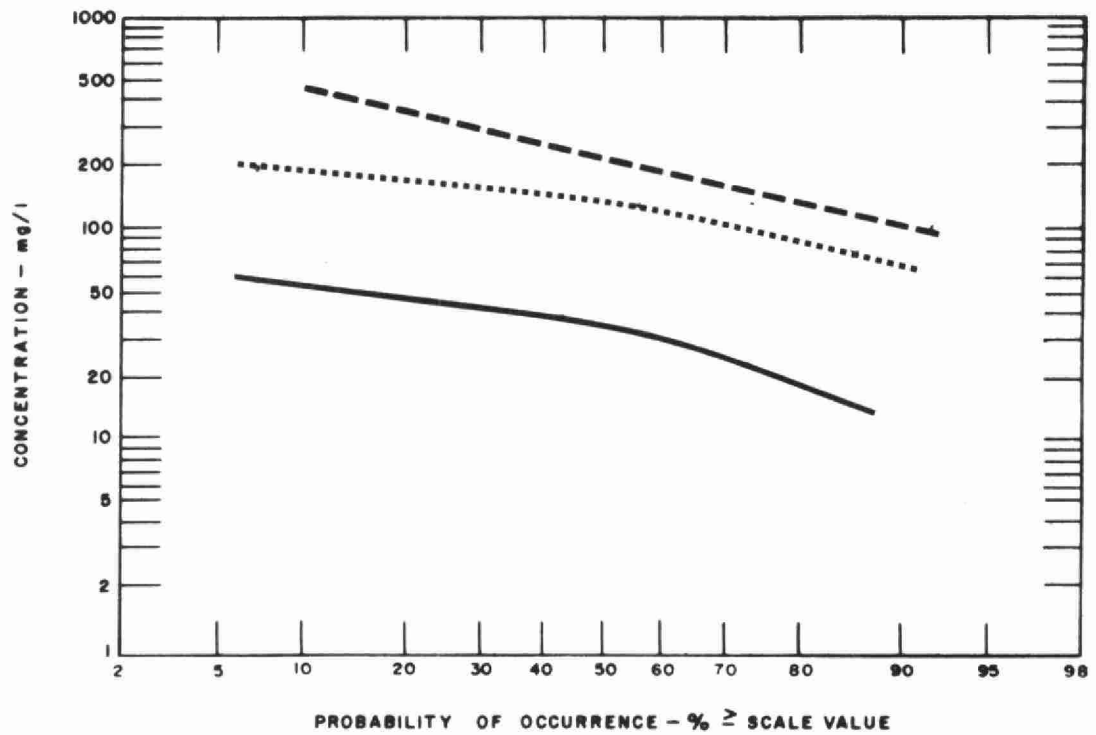
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED pounds	DOSAGE mg/l
JAN	114	3.68	4.5	1.7	-	-
FEB	110	3.93	4.8	3.6	-	-
MAR	127	4.09	5.3	3.3	-	-
APR	212	7.06	9.1	4.8	-	-
MAY	183	5.90	12.7	3.6	-	-
JUNE	160	5.33	7.9	4.1	-	-
JULY	205	6.61	8.8	4.9	-	-
AUG	172	5.55	7.9	3.8	-	-
SEPT	201	6.70	8.8	5.4	-	-
OCT	180	5.80	7.4	4.8	-	-
NOV	150	5.00	6.2	3.2	-	-
DEC	143	4.61	6.2	3.5	-	-
TOTAL	1957	-	-	-	32,000	-
AVERAGE	-	5.37	-	-	-	-

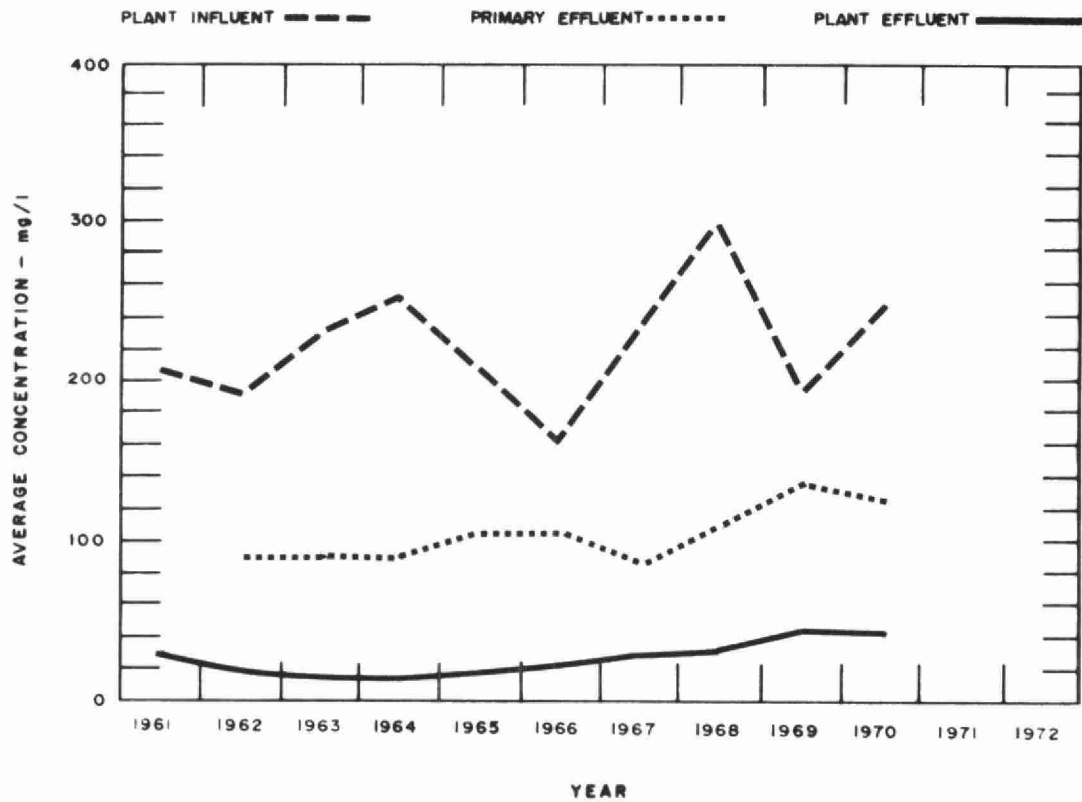


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

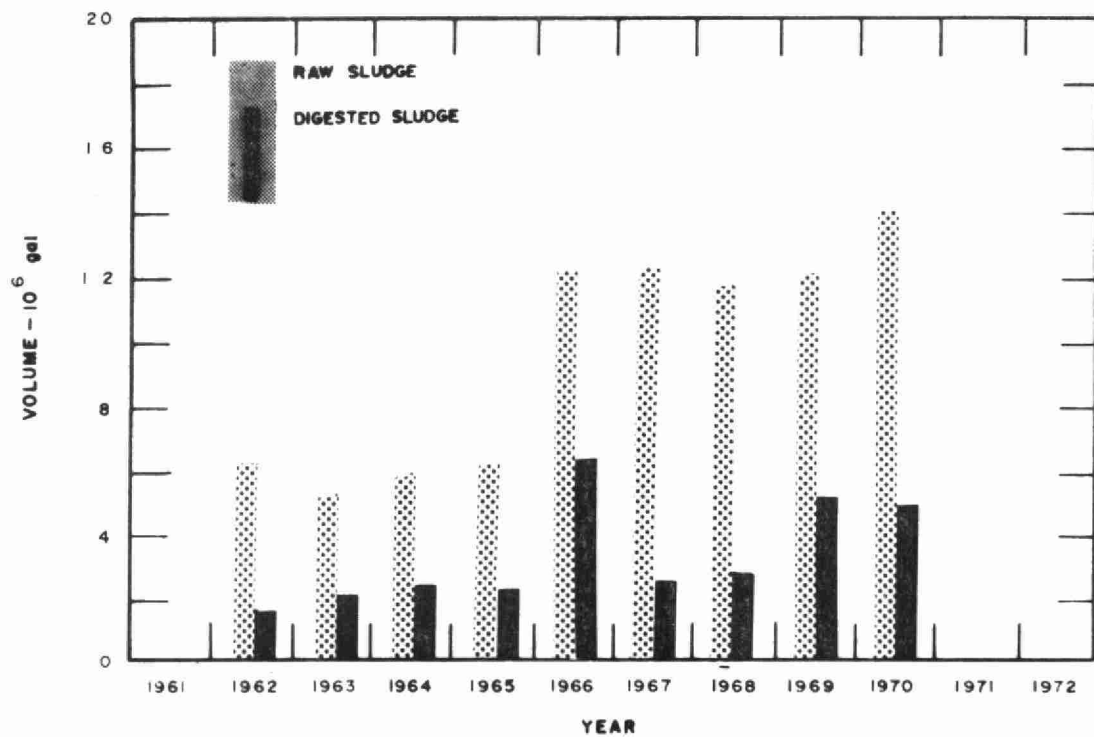
MONTH	BIOCHEMICAL OXYGEN DEMAND						SUSPENDED SOLIDS						GRIT REMOVED cu ft
	INFLUENT		EFFLUENT		REDUCTION		INFLUENT		EFFLUENT		REDUCTION		
	n	mg/l	n	mg/l	%	10 ⁵ pounds	n	mg/l	n	mg/l	%	10 ⁵ pounds	
JAN	1	150	1	50	67	1.2	1	220	1	55	75	1.9	617
FEB	0	-	0	-	-	0	0	-	0	-	-	0	460
MAR	1	260	1	20	92	3.1	1	295	1	25	92	3.4	262
APR	1	110	1	20	82	1.9	1	420	1	25	94	8.4	527
MAY	1	75	1	20	73	1.0	1	160	1	35	78	2.3	612
JUNE	2	85	2	88	0	0	2	150	2	30	80	1.9	576
JULY	2	78	1	18	77	1.2	2	130	1	30	77	2.1	711
AUG	2	120	2	31	74	1.5	2	225	2	13	94	3.6	944
SEPT	0	-	0	-	-	0	0	-	0	-	-	0	635
OCT	1	140	1	42	70	1.8	1	150	1	40	73	2.0	132
NOV	3	187	3	44	76	2.1	3	276	3	68	75	3.1	1026
DEC	1	160	1	60	62	1.4	1	170	1	70	59	1.4	1240
TOTAL	15	-	14	-	-	-	15	-	14	-	-	-	7742
AVERAGE	-	128	-	44	65	1.7	-	246	-	41	77	3.0	645

NOTE - n is the number of samples taken

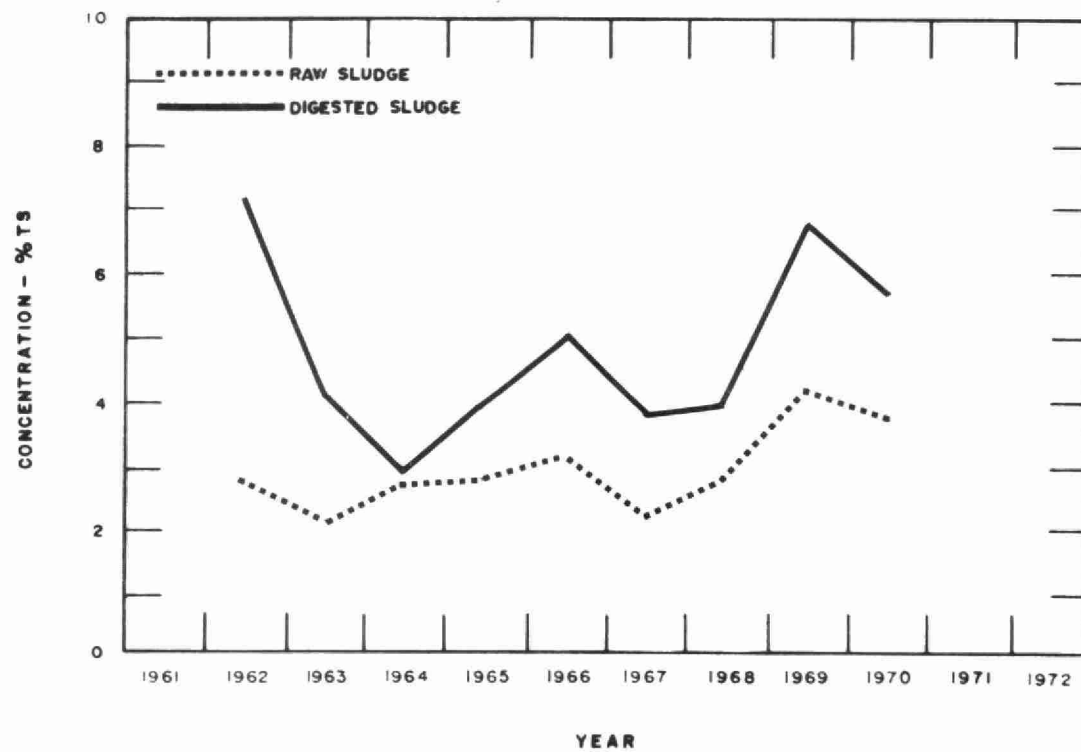
AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY. EFF.		MLSS CONCN mg/l	F/M lb BOD lb MLSS	AIR USED 1000 cu ft lb BOD	WASTE SLUDGE lb/DAY
		BOD	SS	BOD	SS				
		mg/l	mg/l	mg/l	mg/l				
JAN	3.7	55	80	50	55	1800	.10	25.3	
FEB	3.9	-	-	-	-	1380	-	-	
MAR	4.1	220	175	20	25	1390	.58	.6	
APR	7.1	-	-	20	25	1420	-	-	
MAY	5.9	48	85	20	35	1450	.17	2.8	
JUNE	5.3	88	165	88	30	1260	.33	-	
JULY	6.6	47	87	18	30	1160	.24	2.8	
AUG	5.5	67	95	31	13	1140	.29	2.7	
SEPT	6.7	-	-	-	-	1340	-	-	
OCT	5.8	100	130	42	40	1140	.46	1.8	
NOV	5.0	96	138	44	68	1390	.31	2.4	
DEC	4.6	110	160	60	70	1410	.32	1.3	
TOTAL	-	-	-	-	-	-	-	-	
AVERAGE	5.4	94	124	44	41	1360	.31	2.1*	

* Excludes January



DIGESTION

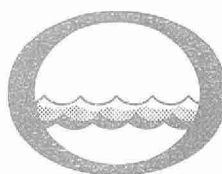


SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS	DEWATERED	LIQUID
	10 ⁶ gal	%	%	10 ⁶ gal	%	%	10 ⁶ gal	%	cu yd	cu yd
JAN	0*	1.9	-	.6	-	-	-	-	-	3635
FEB	1.2	-	-	.4	-	-	-	-	-	2709
MAR	1.3	.1	-	.5	5.5	-	-	.1	-	2749
APR	1.3	3.3	73	.6	5.9	72	-	-	-	3311
MAY	1.3	2.0	-	.4	8.0	-	-	.1	-	2587
JUNE	1.3	7.9	-	.2	-	-	-	.2	-	1355
JULY	1.3	5.5	59	.4	11.1	54	-	.2	-	2203
AUG	1.3	4.6	75	.4	4.2	61	-	-	-	2326
SEPT	1.1	-	-	.4	-	-	-	-	-	2588
OCT	1.3	4.1	61	.3	4.3	55	-	.9	-	1817
NOV	1.3	3.3	71	.5	4.0	65	-	1.5	-	3203
DEC	1.3	5.7	-	.5	-	-	-	2.4	-	2925
TOTAL	14.0	-	-	5.2	-	-	-	-	-	31408
AVERAGE	1.3	3.8	67	.4	5.7	61	-	.8	-	2617

* Digester Cleanout

[illegible]



Water management in Ontario